IDEX CORPORATION

Class 1

ISO 9001 CERTIFIED

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FOR INTERNAL / EXTERNAL DISTRIBUTION

TECHNICAL PRODUCT DATASHEET

Multiplexing

SmartTouch Rockers

P/N:

610-00081-004-IND (4 Position with indicators)
610-00081-004-BLK (4 Position blank)

610-00081-006-IND (6 Position with indicators)
610-00081-006-BLK (6 Position blank)

610-00081-008-IND (8 Position with indicators)
610-00081-008-BLK (8 Position blank)

PRINTED: 12/17/20

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REV: 1.05c December 17, 2020

Product Description

The SmartRocker Switch is designed to work within the IDEX Fire and Safety multiplexing systems. It utilizes Controller Area Network (CAN) and can reside in an ES-Key network, V-MUX network or be utilized within the Digital Truck Designer to reside on the next generation V-MUX network.

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1. Revision Log

Rev	Date	By	Approved	Description
1.0	05-07-2019	WCH		Initial datasheet
1.1	05-27-2019	WJB		Beta software
1.2	6-Aug-2019	WJB		Extended status message and password control of backlight. Address conflict detection.
1.3	19-Sep-2019	WJB		Passcodes to select device type 4 (IOM) or 5 (SPS) to extend addressing. Improve error detection.
1.4	15-Nov-2019	WJB		If normal EsKey, (not V-MUX or Extended EsKey) make the backlight color red Add backlight and dimmer control to Normal EsKey message in bytes 7 and 8. Add latched buttons plus the passwords to control it
1.5	20-Mar-2020	WJB		Add ability to control individual backlights
1.5a	22-April-2020	WCH		Added and corrected optional part numbers
1.5b	4-Dec-2020	WJB		More part number changes.
1.5c	17-Dec-2020	WJB		Added 8 position part number

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2. Part Numbers

2.1. SmartTouch Rocker Switch Part Numbers

SmartRocker, 4 position 610-00081-004-IND	with indicator windows
SmartRocker, 4 position 610-00081-004-BLK	no indicator windows
SmartRocker, 6 position 610-00081-006-IND	with indicator windows
SmartRocker, 6 position 610-00081-006-BLK	no indicator windows
SmartRocker, 8 position 610-00081-008-IND	with indicator windows
SmartRocker, 8 position 610-00081-008-BLK	no indicator windows

These part Numbers include SmartRocker switch assembly with standard black rocker tops and 2 position momentary cam actuators all positions.

2.1. Optional Rocker Tops Part Numbers

(sold separately)

Description	Color	Part Number
Standard Actuator	Black	200-00154-000
Narrow Guarded	Black	200-00154-001
Toggle	Black	200-00154-002
Stationary (Blank)	Black	200-00154-003
Standard Actuator	PANTONE Green	200-00154-004
Standard Actuator	PANTONE Red 186	200-00154-005
Standard Actuator	PANTONE Grey 420 U	200-00154-006
Standard Actuator with indicators	Black	200-00154-007
Locking Actuator	Black	200-00154-008
Finger Guard for narrow actuator	Black	200-00163

2.2. Optional CAM Actuators Part Numbers

(Sold separately)

Description	Part Number
1 Position Momentary	200-00155-000
2 Position Momentary	200-00155-001
2 Position Stationary	200-00155-002
3 Position Stationary	200-00155-003
2 position stationary and 1 position momentary	200-00155-004

2.3. Miscellaneous part numbers

SmartROCKER Switch connector items

Deutsch 6-position mating plug	DT06-6S
Deutsch 6-position mating plug wedge lock	W6S
Deutsch DT series socket (16 GA)	0462-201-16141
Deutsch DT series socket (16 GA) - GOLD	0462-201-1631

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CAN connector items

Deutsch 3-position mating plug - GRAY	DT06-3S
Deutsch 3-position mating plug wedge lock - BLUE	W3S-1939
Deutsch 3-position mating plug wedge lock - ORANGE	W3S
Deutsch DT series socket (16 GA) - GOLD	0462-201-1631
Deutsch DT series 3-way “Y” receptacle	DT04-3P-P007
Deutsch 3-position mating plug with terminating resistor	DT06-3S-P006

3 *SmartRocker* Switch layout

The switches and their associated LEDs are enumerated as follows.

4 position				6 position		8 position	
sw1	sw3	sw5	sw7	sw9	sw11	sw13	sw15
sw0	sw2	sw4	sw6	sw8	sw10	sw12	sw14

This numbering scheme is the same as the 1-Touch and SmartTouch panels.

3.1 *SmartRocker* setup:

The Smart Rocker can be setup for a variety of configurations by entering passcodes through the switches themselves.

Switches **sw0** and **sw1** (the two left-most switches) are used for entering passcodes. To enter passcode mode, a lead-in code must be entered by the user within the first 60 seconds of power-up. This lead-in code is: **0-1-1-0**. In other words, the left-most switch is pressed as **DOWN-UP-UP-DOWN**. When a valid lead-in is detected, the switch panel will change color to indicate that you are in passcode mode.

sw1	sw3	sw5	sw7	sw9	sw11	sw13	sw15
sw0	sw2	sw4	sw6	sw8	sw10	sw12	sw14

You now have 30 seconds to enter an 8-bit passcode. Like the lead-in passcodes are entered by pressing the 2 left-most switches up or down. The green LED will turn off while the switch is pressed. Pressing the upper-left switch (sw1) enters a 1 and pressing the lower left switch (sw0) enters a 0. Pressing any other switch will exit passcode mode.

3.2 Passcodes (follows 0-1-1-0 lead-in)

Binary	Hex	Function	Description
0001 xxxx	1x	ID	Set the CAN ID where xxxx is one of 16 possible CAN address. (default = 0) **Note**: If extended (dual) EsKey mode is on, then the CAN ID should be an even number.
0010 xxxx	2x	brightness	Set the LED brightness where xxxx is one of 16 possible LED brightness settings. (default =1000 = 8_{10})
0100 xxxx	4x	Momentary	Set switch xxxx to momentary. (output on while pressed, off when centered)
0101 xxxx	5x	Latched	Set switch xxxx to latched. (output toggles when pressed)
1001 1001	99	default	Set factory default settings.
1000 1000	88	EsKey	Normal EsKey addressing. (default) The CAN ID is the only ID that is processed. 16 address are allowed but only green and blue LEDs are controllable. Red backlighting and brightness can also be controlled
1000 1001	89		Extended (dual) EsKey addressing. The CAN ID and the CAN ID+1 are processed. 8 CAN address-pairs are permitted. Control of red and white backlighting is enabled. **Note**: The CAN ID should be an even number. (8 CAN addresses are possible)
1010 1000	A8	V-MUX	V-MUX mode is disabled. (default)
1010 1001	A9		V-MUX mode is enabled. EsKey Status CAN messages are suppressed. Control of green, blue, red, brightness and white backlighting are included in the incoming CAN message. 16 CAN addresses are possible.
1011 0000	B0	Group Latched and Momentary	Display the configuration of each button. Blue=Latched. Green=Momentary
1011 1000	B8		Set all switches to momentary. (default)
1011 1001	B9		Set top row to latched and bottom row to momentary.
1011 1010	BA		Set bottom row to latched and top row to momentary.
1011 1011	BB		Set all switched to latched.
1100 1000	C8	back light	Backlighting is initially off (default) but may be overridden by CAN messaging.
1100 1001	C9		Backlighting is initially on but may be overridden by CAN messaging.
1101 1000	D8	device type	Set device type to SPS (device type 5) (default)
1101 1001	D9		Set device type to IOM (device type 4) Useful for expanding the number of panels that can be supported.

When a valid passcode is entered, a green acceptance pattern will occur.
An exception to this is when changing the latched vs momentary state of switches. In this case the panel will briefly show the state of all the switches as green for momentary and blue for latched.
If an invalid passcode is entered a red passcode failure pattern will be displayed.
In either case you are given another 60 seconds to enter another passcode lead-in (0110)
All passcode settings are saved in non-volatile memory.

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3.3 **Base conversion table** for passcode xxxx settings

1 = UP

0 = DOWN

Decimal	Binary	Hexadecimal
0	0000	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7
8	1000	8
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D
14	1110	E
15	1111	F

3.5 Backlighting color

If the Smart Rocker panel is operating in EsKey mode, the backlight color is red.
When operating in Extended EsKey mode or V-MUX mode, the backlight color is white.

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4 Switch panel addressing

The *SmartRocker* can be setup to one of 16 CAN address using the passcode 1000 xxxx where xxxx is from 0000 to 1111.

CAN traffic

Three CAN message are supported in the *SmartRocker*.

State message Panel transmits all switch positions.
Status message Panel transmits EsKey status message
LED message Panel receives lighting instructions.

4.1 **State Message**: (Transmitted by switch panel)

The state message broadcasts the state of all the switches. The state message is sent 20 times/second or when a switch is pressed or released.

CAN address: 0x18EF1Etx where x is 0 to F depending on the CAN ID (default=0) and t is the device type t=5 (default SPS type) or t=4 (optional IOM type).

State message CAN payload:

Payload byte	Payload bit (binary)	Payload bit (Hex)	Switch #
1	---- ---X	01	0
1	---- ---X-	02	1
1	---- -X--	04	2
1	---- X---	08	3
1	---X ----	10	4
1	--X- ----	20	5
1	-X-- ----	40	6
1	X--- ----	80	7
2	---- ---X	01	8
2	---- --X-	02	9
2	---- -X--	04	10
2	---- X---	08	11
2	---X ----	10	12
2	--X- ----	20	13
2	-X-- ----	40	14
2	X--- ----	80	15

All other payload bytes (3-8) are 0.
If a switch is asserted, the payload bit (X) is set to 1.

Examples: (ID and payload numbers are in hexadecimal)

CAN ID=0	Payload bytes								
	1	2	3	4	5	6	7	8	
0x18EF1E50	01	00	00	00	00	00	00	00	sw0 is pressed on SPS address 0
0x18EF1E50	00	90	00	00	00	00	00	00	sw8 and sw15 are pressed.

4.2 Status Message: (Transmitted by switch panel)

The status message broadcasts the version and device ID the switch panel. A status message is sent 2.5 times/second unless the *SmartRocker* is in V-MUX mode in which case the status message is suppressed.

CAN address: 0x18EFFF*tx* where *x* is 0 to F depending on the CAN ID (default=0) and *t* is the device type (5=SPS or 4= IOM) The status message payload is:

Payload bytes (static)							
1	2	3	4	5	6	7	8
00	FF	00	00	CAN ID	Version	00	preferences

Note that if the *SmartRocker* is in dual (extended) EsKey mode then a status message will be alternately be sent from CAN ID and from CAN ID+1.

Important: If extended EsKey addressing is employed, then the CAN ID should be set to an even number.

The preferences byte (8) reflects the state of 3 user settable options.

---- ---X	1= Dual (extended addressing) mode
---- --X-	1=V-MUX mode (status messages are suppressed so you won't see this)
---- -X---	1=Backlight mode.
---- X----	1=IOM device type 4. 0=SPS device type 5

Traditionally this byte has been sent as 0 but this has been added as a diagnostic aid.

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4.3 **LED control messages**: (Received by the switch panel)

CAN ID 0x18EF*tx*1E (*t*=device type 5=SPS or 4=IOM) (*x*=device ID 0 to F)

Payload byte	Payload bit	Switch #	EsKey ID (5x)	EsKey ID+1 (extended)	V-MUX ID (5x)
1	---- ---X	0	Green	White	Green
1	---- --X-	1	Green	White	Green
1	---- -X--	2	Green	White	Green
1	---- X---	3	Green	White	Green
1	---X ----	4	Green	White	Green
1	--X- ----	5	Green	White	Green
1	-X-- ----	6	Green	White	Green
1	X--- ----	7	Green	White	Green
2	---- ---X	8	Green	White	Green
2	---- --X-	9	Green	White	Green
2	---- -X--	10	Green	White	Green
2	---- X---	11	Green	White	Green
2	---X ----	12	Green	White	Green
2	--X- ----	13	Green	White	Green
2	-X-- ----	14	Green	White	Green
2	X--- ----	15	Green	White	Green
3	---- ---X	0	Blue	Red	Blue
3	---- --X-	1	Blue	Red	Blue
3	---- -X--	2	Blue	Red	Blue
3	---- X---	3	Blue	Red	Blue
3	---X ----	4	Blue	Red	Blue
3	--X- ----	5	Blue	Red	Blue
3	-X-- ----	6	Blue	Red	Blue
3	X--- ----	7	Blue	Red	Blue
4	---- ---X	8	Blue	Red	Blue
4	---- --X-	9	Blue	Red	Blue
4	---- -X--	10	Blue	Red	Blue
4	---- X---	11	Blue	Red	Blue
4	---X ----	12	Blue	Red	Blue
4	--X- ----	13	Blue	Red	Blue
4	-X-- ----	14	Blue	Red	Blue
4	X--- ----	15	Blue	Red	Blue
5	---- ---X	0			Red
5	---- --X-	1			Red
5	---- -X--	2			Red
5	---- X---	3			Red
5	---X ----	4			Red
5	--X- ----	5			Red
5	-X-- ----	6			Red
5	X--- ----	7			Red
6	---- ---X	8			Red
6	---- --X-	9			Red
6	---- -X--	10			Red
6	---- X---	11			Red

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Payload byte	Payload bit	Switch #	EsKey ID (5x)	EsKey ID+1 (extended)	V-MUX ID (5x)
6	---X ----	12			Red
6	--X- ----	13			Red
6	-X-- ----	14			Red
6	X--- ----	15			Red
7	---- ---X		Brightness level		Brightness level
7	---- --X-		Brightness level		Brightness level
7	---- -X--		Brightness level		Brightness level
7	---- X---		Brightness level		Brightness level
7					
7					
7					
7	X--- ----		Brightness enable		Brightness enable
8	---- ---X		Backlight on/off		Backlight on/off
8					
8					
8					
8					
8					
8					
8	X--- ----		Backlight enable		Backlight enable

The enable bits on the backlight and brightness bytes exist so that those settings in the message can be ignored until such time as they need to be changed. In other words, the enable bit must be on for the brightness or backlight state to be acted on.

Conversely, if brightness or backlighting is enabled in EsKey mode, then the green and blue LED information is ignored for that message. This is so brightness and backlighting can be controlled from a different source than the SuperNode which may be unaware of the LED color.

Note that any changes to the LED brightness and backlight state will NOT be saved in non-volatile memory. The panel will revert to its saved settings whenever it is powered on.

If the switch panel does not receive a valid CAN message for 5 seconds, it will display a rolling red LED error pattern.

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4.3.1 EsKey mode

Standard EsKey mode is limited to controlling green and blue LEDs .
Set the network mode to EsKey mode by entering the password – 0110 - **1000 1000**.

CAN address 0x18EFtn1E t=5 or 4 & n=0 to F	CAN payload bytes							
	1	2	3	4	5	6	7	8
	Green		Blue		Backlights		brightness	backlight
Bitmapped button #	7 - 0	15 - 8	7 - 0	15 - 8	7-0	15-8	MSB = enable 4 LSBs = intensity 0x00 = ignore 0x80 = minimum 0x88 = medium 0x8F = maximum	MSB = enable 0x00 = ignore 0x80 = all backlights off 0x81 = all backlights on 0x82 = use bytes 5 and 6 to control individual backlights.

The 2 colors can be combined to form a 3rd color.
If brightness or backlight bytes are enabled (MSB set) then the Green and Blue LED data is ignored.
If brightness or backlight byes are disabled (MSB =0) then the brightness or on/off information is ignored.
In Normal EsKey mode, the backlight is red.
In Extended EsKey or V-MUX mode, the backlight is white.

4.3.2 Extended EsKey (dual address) mode

Extended EsKey mode uses the CAN ID+1 to permit control of red and white (back) lighting.
Set the network mode to EsKey mode by entering the password – 0110 - **1000 1001**.

CAN address 0x18EFtn1E where t=5 or 4 and n = 0 to F	CAN payload bytes							
	1	2	3	4	5	6	7	8
	White		Red		Not used			
Bitmapped button #	7 - 0	15 - 8	7 - 0	15 - 8				

The 3 colors can be combined to form 7 colors. This switch panel does not have a separate white backlight LED. To create a quasi-white color all three LEDs are turned on. If the WHITE color is selected in the message above, all 3 LEDs will be turned on but only if green, red and blue are all off. If red, green or blue are on, then that color combination will be shown.

4.3.3 V-MUX mode

V-MUX mode suppresses the EsKey status message.
V-MUX mode is similar to ES-Key mode in that the LEDs are controlled via CAN messaging. However, the CAN payload is expanded passed the ES-Key 32 bit limitation to include control over the red LEDs. In other words, you have control of Green and Blue as well as Red in the 5th and 6th byte of the message for a total of 8 colors including off. In addition, the 7th payload byte is used to adjust LED intensity and the 8th byte can be used to control backlighting.
Set the network mode to **V-MUX** by entering the password – 0110 - **1010 1001**.

CAN address 0x18EFtn1E where T=5 or 4 and n=0 to F	CAN payload bytes							
	1	2	3	4	5	6	7	8
	Green		Blue		Red		brightness	backlight
Bitmapped button #	7 - 0	15 - 8	7 - 0	15 - 8	7 - 0	15 - 8	MSB = enable 4 LSBs = intensity	MSB = enable LSB = backlight on/off
							If enable=0 the byte is ignored	

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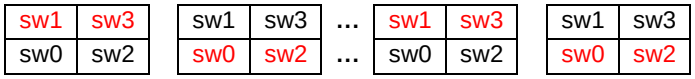
5 LED flash codes

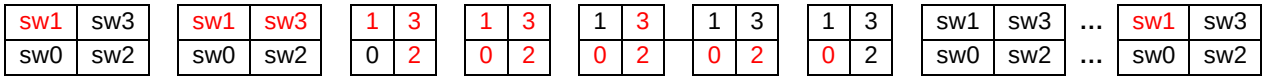
The *SmartRocker* will display LED patterns to indicate a variety of errors or outcomes.

Switches shown in black are not lit.
Only the 2 left-most switch pairs (sw0 – sw2) display a pattern. All other switches are unlit.

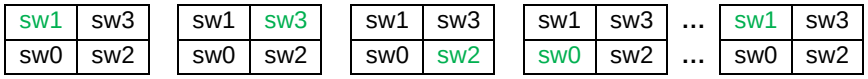
CAN bus-off error



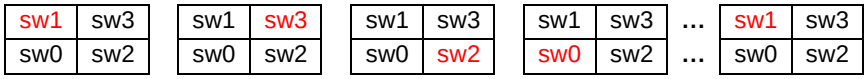
No CAN traffic addressed to *SmartRocker* received for 5 seconds (slow pattern) -or-
CAN passive error pattern (fast pattern)



Password accepted pattern



Password rejected pattern



CAN address conflict detected pattern